Against Structural and Counterfactual Explanations of Highly-Idealized Models in Physics
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Much of the recent literature on explanation has aimed to expand the scope of philosophical accounts of explanation to reflect the scope of the explanatory practices of science. Alisa Bokulich has developed a structural account of explanation that she claims is capable of correctly judging certain highly-idealized, or non-representing, models as explanatory. These models either fall outside the range of other accounts of explanation or are deemed non-explanatory. However, they are considered explanatory by some philosophers and physicists. Bokulich argues that this is in part because even though they do not accurately represent the target system they are able to capture its structure in providing reliable counterfactual information in terms of w-questions. Models of semiclassical mechanics are of particular interest to Bokulich because the dependency relations between the classical trajectories and the quantum systems cannot be construed as causal. In this paper, I examine a worry that once the account of structural model explanations allows for such fictions as classical electron trajectories in quantum systems, it will be unable to reject models that are widely considered non-explanatory, such as the models of Ptolemaic astronomy. In order to evaluate this concern, I look at two reasonable approaches to measuring or assessing a model’s structural information in terms of counterfactuals. I argue that neither approach is ultimately satisfactory. The simplest approach of just measuring structure as the number of w-questions proves impossible, and the comparative approach, while succeeding in debarring the Ptolemaic explanation, fails to find the semiclassical model explanatory. If neither approach is capable of identifying the semiclassical model as explanatory, then, I argue, the measure of structural similarity that a highly-idealized model bears to its target system is largely irrelevant to its being explanatory.

Scientific Understanding and Explanatory Interest
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Understanding has been already attracting many debates in epistemology. Kvanvig (2003) claims that understanding, like knowledge, is factive. However, several commentators have argued that understanding, especially the scientific one, is often not factive. For example, idealization or simplification can provide...
understanding for scientists even it is not true in a strict sense (Elgin 2009).
Kvanvig only preserves understanding when the falsehoods are peripheral. But
understanding seems also probably arise even false beliefs are not peripheral but
central (Riggs 2009).

The aim of this paper is to show the thing that really matters here is a distinction
between reactive and objective attitudes in ascription of understanding. That
notion is elaborated from Peter Strawson’s original idea in a totally different
context. In his opinion, only in a reactive attitude, can we see each other as a
fully responsible agent; and here also as a full agent with epistemic responsibility.

A reactive attitude in ascribing understanding implies explaining with specific
interests. Contrastive explanation has emphasized a kind of interests. Explainer
needs, at least potentially, an answer for a significant question in his own view:
‘Why is it P rather than Q?’ Factivity characterizes another kind of explanatory
interest. To explain something in a reactive attitude involves a commitment for
significance of corresponding contrastive questions, and factive commitments for
both explanandum and explanans. On the contrary, ascribing understanding to
someone in an objective attitude would deny or remain indifference on those
commitments, such as cases of understanding arising from false theories in
history of science.

Therefore, understanding in a reactive attitude does satisfy factivity requirement,
which is factivity qua explanatory interest, rather than itself. And understanding
without factivity could also be ascribed in scientific practice, not just in an
honorific use as Kvanvig claims, but in an objective attitude.

On Characterizing Relevance
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Relevance is one of the most fundamental concepts in philosophy and in
philosophy of science in particular. For instance, it is often proposed that
explanatory models describe accurately “the relevant factors” and leave out the
irrelevant ones. Also, in many current accounts of scientific representations, it is
often assumed that scientific models can represent their targets, if the
representational relationships are based on “relevant” similarities, resemblances,
isomorphisms (or other morphisms) between models and their targets.

However, there is remarkably little discussion on how to define relevance in the
philosophy of science, and in current literature on modeling in particular. It is
slightly surprising, because as a concept “relevance” is far from trivial. On the
contrary, it has been notoriously difficult to characterize it in a satisfactory way.
For example, most of the classical accounts on explanations, such as Hempel’s
deductive-nomological model or Salmon’s causal account of explanation have
struggled with the satisfactory notion of relevance. In addition, relevance still
raises puzzles for most, if not all, current accounts of explanation (Hitchcock 1995; Imbert 2013).

In what follows, my focus is on the question, how to define the notion of relevance. In the first part of this paper, I'll sketch a general characterization for the notion of relevance. However, depending on the specific context, the interpretation of relevance varies. In the second part of this talk my goal is to articulate some of the ways that the notion of relevance has been understood in various scientific domains. In the final part of this paper I will focus on the “fundamental” question: Is relevance something that an item or an entity “has”, or is something that is ascribed to items and entities by intentional agents for some purposes or goals?